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United States  
Department of  
Agriculture  
  
Soil  
Conservation  
Service  
  
Montana  
Agricultural  
Experiment  
Station  
  
Bozeman,  
Montana

# MONTANA WATER SUPPLY OUTLOOK

Snowpack and Streamflow  
Forecasts as of  
January 1, 1984

UNITED STATES DEPARTMENT OF AGRICULTURE  
SOIL CONSERVATION SERVICE  
SNOW SURVEY UNIT  
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## Streamflow variable

Based on present conditions, runoff west of the Divide is expected to be below average on all streams. East of the Divide, spring and summer streamflows are expected to be near average from most drainages. Exceptions are those streams that flow into the Missouri River from the west downstream from Canyon Ferry Reservoir. Below average runoff is expected for this area.

Forecasts are issued only on larger rivers this month.

Forecasts will be issued for all streams starting next month.

The Montana Water Supply Outlook is a publication of the U.S. Soil Conservation Service. The SCS administers the Cooperative Snow Survey Program in cooperation with other federal, state and private agencies, organizations, and individuals.

The report is prepared by SCS, Snow Survey and Water Supply Forecast Staffs, Room 443, Federal Building, 10 East Babcock, Bozeman, Montana.

## Snowpack mostly below average

The mountains in the southern part of the State received good moisture in September while northern areas were somewhat drier. Most mountainous areas had below average snowfall during October and November. Typically, higher elevations begin to accumulate snow in late September or early October but this year the start of snow buildup was delayed until late November. December was a good snowfall month in southern areas and somewhat less in northwest drainages. Late December brought extremely cold temperatures to all of Montana.

On January 1, the mountain snowpack was well below average in northwest drainages encompassing the headwaters of the Kootenai, Flathead, St. Mary's, Marias, Teton and Sun River systems. The remainder of the Columbia River drainage in Montana has below average water stored in the snowpack. The snowpack increases to average or above in the more southern drainages with above average snowpack in the Red Rock and Ruby River headwaters, and portions of the Madison and Gallatin River drainages. The Crazy Mountains and parts of the Big Belt Mountains also have above average snowpack. Most headwater areas of the Yellowstone River and its tributaries have near average snowpack for this date.

This year's snowpack is similar to last season except for better snow in smaller mountain ranges in Central Montana. Another similarity to last season is that heavy snowpacks are building in states south of Montana.

Soils under the snowpack are generally wetter than normal in southern drainages and average to drier than normal in northern drainages.

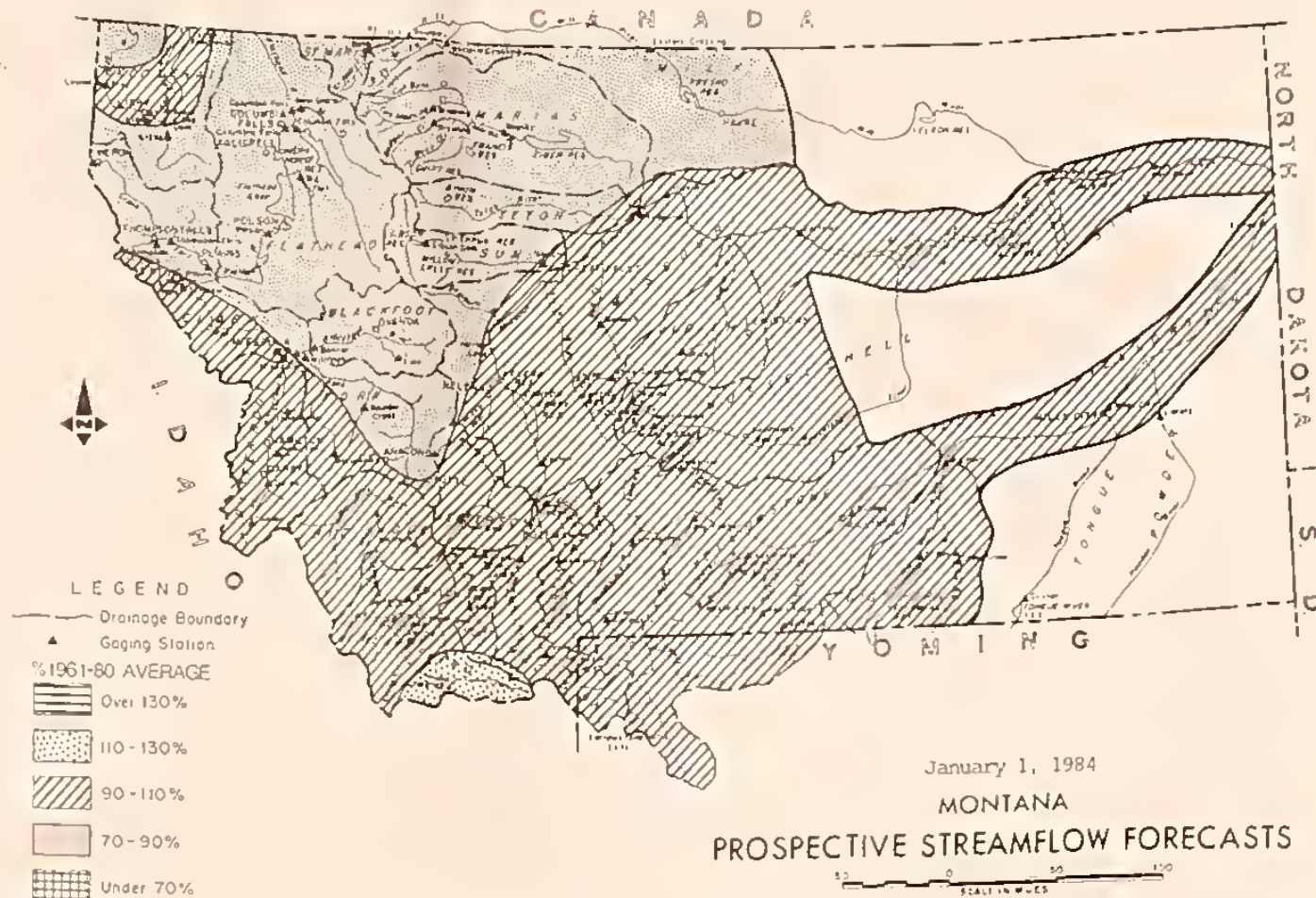


ALL AVERAGES IN THIS PUBLICATION  
ARE BASED ON THE 20-YEAR PERIOD,  
1961-1980.

## Map of snow survey sites

A map of Montana Snow Survey Sites is included in this Water Supply Outlook Report. Please keep this copy, because future issues this season will not include a map.

A few extra copies are available from the Snow Survey Office. Maps showing only SNOTEL sites are also available. If needed, additional copies may be requested.



January 1, 1984

MONTANA

PROSPECTIVE STREAMFLOW FORECASTS



# Missouri River & Hudson Bay Drainages

## STREAMFLOW FORECASTS

GAGING STATION AND FORECAST POINT	THIS YEAR				PAST RECORD			
	1984	1983	1982	1981	1980	1979	1978	1977
April - September								
BIG HOLE RIVER near McAllister (4)	750	99	760	695	100	749	672	698
HADISON RIVER near McAllister (4)	890	105	947	718	107	749	672	698
GALLATIN RIVER near Gateway (7)	555	102	534	480	103	451	464	464
MISSOURI RIVER at Toston (7)	2663	105	2885	2,545	2300	105	2385	2,196
SUN RIVER at Gibson Dam (8)	4023	101	349	570	3500	101	304	522
MISSOURI RIVER at Fort Benton (9)	405	75	247	542	380	73	232	518
MARIAS RIVER near Shelby (11)	4573	100	4,570	4,030	100	4,030	4,030	4,030
MISSOURI RIVER near Laramie (11)	4980	100	4,980	4,380	100	4,380	4,380	4,380
MISSOURI RIVER below Fort Peck Dam (11)	4960	100	4,961	4,426	100	4,426	4,426	4,426
INFLOW LAKE SAKAKAWA, ND (11)	13000	102	12,755	11850	102	12,239	12,239	12,239

- (1) Adjusted for storage in Lima Reservoir.
- (2) Adjusted for storage in Lima and Clark Canyon Reservoirs.
- (3) Adjusted for storage in Mehgen Lake.
- (4) Adjusted for storage in Mehgen Lake and Ennis Lake.
- (5) Sum of West Fork Hyalite Creek and East Fork Hyalite Creek above the Reservoir.
- (6) Adjusted for storage in Middle Creek Reservoir.
- (7) Adjusted for storage in Lima, Mehgen, Ennis & Clark Canyon Reservoirs.
- (8) Adjusted for storage in Gibson Reservoir & diversions.

- (9) Adjusted for storage in Lima, Clark Canyon, Mehgen, Ennis, Gibson, Pishkun, Willow Creek & Canyon Ferry Reservoirs.
- (10) Adjusted for storage in Two Medicine Reservoir & diversions in Two Medicine Canal.
- (11) Adjusted for all upstream reservoirs.
- (12) Flow at Eastern Crossing minus St. Mary's Canal.
- (13) Adjusted for storage in Lake Sherburne.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

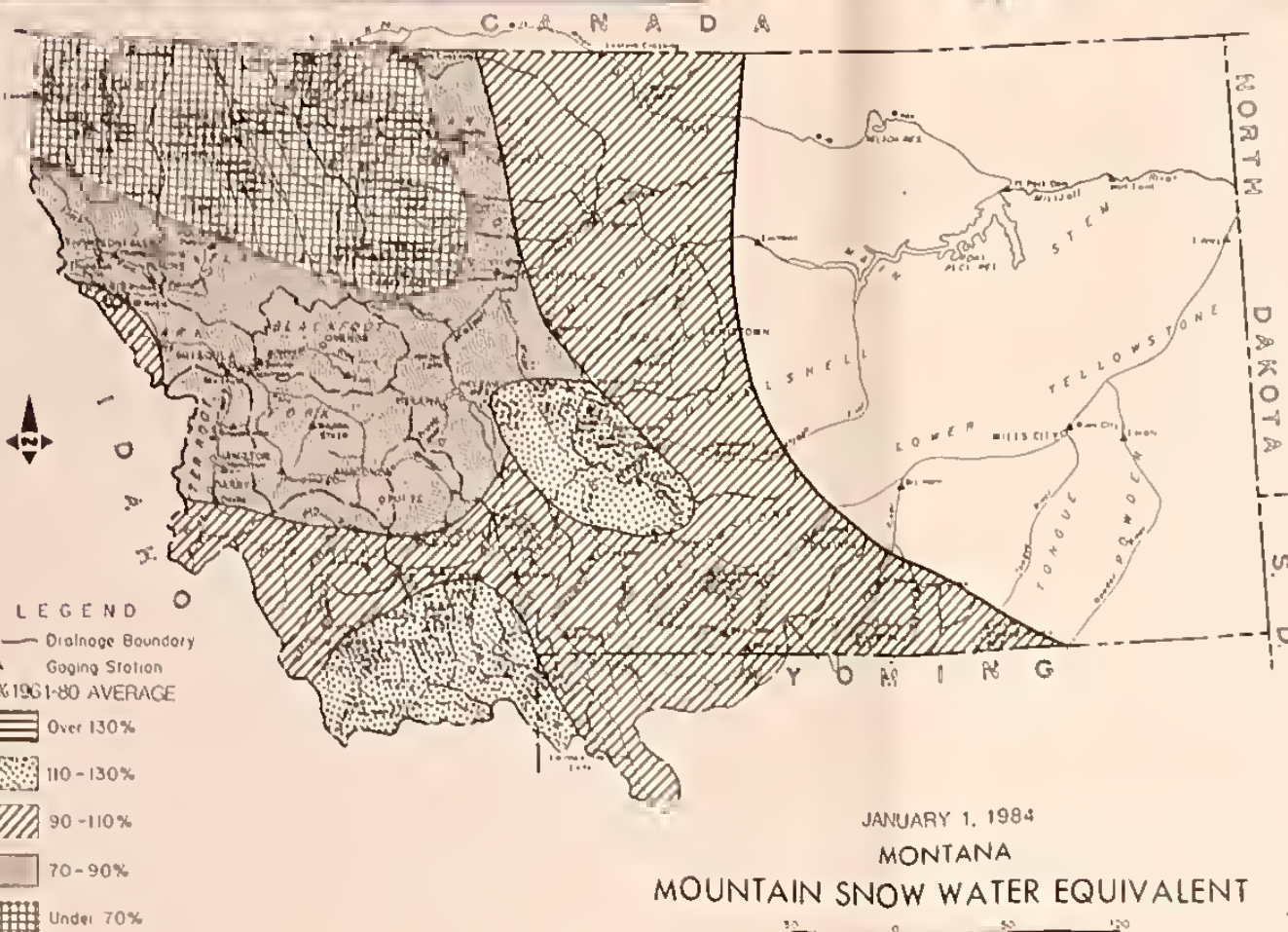
# Yellowstone River Drainage

## STREAMFLOW FORECASTS

GAGING STATION AND FORECAST POINT	THIS YEAR				PAST RECORD			
	1984	1983	1982	1981	1980	1979	1978	1977
April - September								
YELLOWSTONE RIVER at Corbin Springs	2165	107	1725	2,027	1820	108	1397	1,686
YELLOWSTONE RIVER near Livingston	2550	107	2,379	2,125	108	563	563	563
CHAMBERLAIN RIVER near Buffalo	645	103	628	570	101	563	563	563
YELLOWSTONE RIVER at Billings	4666	104	3133	4,516	4000	104	3793	3,833
BIGHORN RIVER near St. Xavier (3)	2109	107	2060	1,976	1920	107	1849	1,794
YELLOWSTONE RIVER at Miles City (4)	7070	104	6,787	6,150	104	5,906	5,906	5,906
YELLOWSTONE RIVER near Sidney (5)	7802	104	7,518	6800	104	6,544	6,544	6,544

- (1) Adjusted for storage in Mystic Lake.
- (2) Adjusted for storage in Cooney Reservoir.
- (3) Adjusted for storage in Buffalo Bill, Boysen, Bull Lake, Pilot Butte and Bighorn Reservoirs.
- (4) Adjusted for storage in Bull Lake, Buffalo Bill, Boysen, Pilot Butte, Bighorn and Tongue River Reservoirs.
- (5) Adjusted for reservoirs shown in (4) and diversions into the Lower Yellowstone Canal.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE



# SNOW SURVEY DATA

SNOW January 1984		THIS YEAR		PAST RECORD	
DRAINAGE BASIN and SNOW COURSE		Date of Survey	Snow Depth (Inches)	Water Content (Percent)	Water Content (Inches)
NAME	Elevation				
ARCH FALLS	7350	K/27	25	5.3	5.0
ASHLEY DIVIDE	4820	K/27	18	2.2	3.4
ASHLEY LAKE	4000	K/27	16	1.6	2.6
BADGER PASS PILLOW	6900	1/01	SP	6.4	8.1
BANFIELD MOUNTAIN	5600	K/28	25	5.2	10.0
BARKER LAKE PILLOW	5600	1/01	SP	5.2	9.8
BARKER LAKE PILLOW	8250	1/01	SP	5.3	11.8
BASIN CREEK	7180	K/28	16	3.0	6.6
BASIN CREEK PILLOW	7180	1/01	SP	2.0	4.8
BEAGLE SPRINGS PILLOW	8850	1/01	SP	4.0	3.6
BEAR PAW SKI AREA	5200	K/26	14	1.8	3.2
BIG SKY	7700	1/03	34	8.7	7.9
BLACK BEAR	7950	K/27	6.6	19.0	25.3
BLACK BEAR PILLOW	7950	1/01	SP	18.4	20.8
BLACK PINE	7100	K/28	19	3.6	4.1
BLACK PINE PILLOW	7100	1/01	SP	4.2	4.8
BLOODY DICK	7600	K/27	22	5.2	-
BLOODY DICK PILLOW	7550	1/01	SP	3.7	5.4
BOULDER MOUNTAIN	7950	K/27	36	8.4	-
BOULDER MOUNTAIN PILLOW	7950	1/01	SP	10.8	9.6
BOX CANYON PILLOW	6700	1/01	SP	3.4	3.5
BRIDGER BOWL	7250	K/29	41	11.8	9.0
BRIDGER BOWL PILLOW	7250	K/29	SP	10.0	8.5
CALVERT CREEK	6430	K/28	21	4.2	-
CALVERT CREEK PILLOW	6430	1/01	SP	3.5	3.6
CARROT BASIN	9000	K/29	58	17.6	19.4
CARROT BASIN PILLOW	9000	1/01	SP	15.3	15.9
CASHE CREEK PILLOW	7800	1/01	SP	3.8	2.7
CHESSMAN RESERVOIR	6200	K/29	10	1.5	3.2
CLOVER MEADOW PILLOW	8800	1/01	SP	10.5	7.0
COLE CREEK	7850	K/29	29	7.0	9.7
COLE CREEK PILLOW	7850	1/01	SP	6.6	10.7
COMBINATION	5600	K/28	14	1.9	3.0
COMBINATION PILLOW	5600	1/01	SP	2.6	3.4
COPPER BOTTOM	5200	K/20	18	3.2	3.3
COPPER BOTTOM PILLOW	5200	1/01	SP	5.6	5.1
COPPER CAMP	6950	K/20	31	7.8	10.0
COPPER CAMP PILLOW	6950	1/01	SP	8.1	10.4
COPPER CREEK	5700	K/20	21	4.5	5.0
COPPER LAKE CREEK	6100	K/20	29	6.7	7.5
COYOTE HILL	4200	K/28	20	3.0	4.0
CRYSTAL LAKE PILLOW	6050	1/01	SP	5.1	6.0
DAISY PEAK	7600	1/03	21	4.2	4.8
DALY CREEK PILLOW	5780	1/01	SP	4.0	6.0
JARVHOLME LAKE PILLOW	8700	1/01	SP	13.3	8.9
JEANMAN CREEK	6450	K/29	23	4.6	3.5
JEANMAN CREEK PILLOW	6450	1/01	SP	4.3	3.5
DESERT MOUNTAIN	5600	K/28	23	4.6	8.1
DEVILS SLIDE	8100	K/27	39	9.6	10.0
DISCOVERY BASIN	7050	K/27	19	3.4	4.0
DIVIDE PILLOW	7800	1/01	SP	6.0	6.8

## SUMMARY of SNOW MEASUREMENTS

RIVER BASIN and SUBWATERSHED		Number of Gaging Stations		THIS YEAR'S SNOW WATER AS PERCENT OF	
		Last Year	Average		
Beaverhead	16	83	118		
Ruby	5	101	118		
Big Hole	15	77	87		
Boulder	12	56	68		
Jefferson	48	79	99		
Madison	23	87	111		
Gallatin	16	100	101		
Missouri Headwater West-side Missouri (Toston-Cascade)	9	62	67		
Smith-Belt-Arrow	7	111	92		
Missouri Main-stem Teton & Sun	16	86	81		
Harris	5	83	57		
Harris-Teton-Sun Judith-Musselshell	3	65	55		
Milk	8	73	56		
Milk	10	108	92		
Bear Paws	10	73	64		
Missouri (Total)	6	157	102		
Saskatchewan St. Mary's	5	60	57		
Bow River in Alberta	--	--	--		



## SUMMARY of SNOW MEASUREMENTS

RIVER BASIN and SUBWATERSHED		Number of Gaging Stations		THIS YEAR'S SNOW WATER AS PERCENT OF	
		Last Year	Average		
Upper Yellowstone	13	121	96		
Shields	6	119	103		
Boulder & Stillwater	3	111	90		
Rock Creek & Clark's Fork	12	116	93		
Yellowstone (ab Bighorn River)	34	118	95		
Bighorn/Wyoming	6	105	108		
Little Bighorn	--	--	--		
Bighorn (Total)	--	--	--		
Tongue	--	--	--		
Powder	--	--	--		
Yellowstone (Total)	40	116	97		



SNOW January 1984		THIS YEAR		PAST RECORD	
DRAINAGE BASIN and SNOW COURSE		Date of Survey	Snow Depth (Inches)	Water Content (Percent)	Water Content (Inches)
NAME	Elevation				
NEZ PERCE CAMP	5650	K/26	24	5.5	-
NEZ PERCE CAMP PILLOW	5650	1/01	SP	5.9	5.9
NDISY BASIN	6040	K/28	72	18.0	25.3
NDISY BASIN PILLOW	6040	1/01	SP	17.2	19.3
NORTH FK. ELK CREEK	6250	K/30	21	4.5	5.3
NORTH FK. ELK CREEK PILLOW	6250	1/01	SP	4.1	5.4
NORTHEAST ENTRANCE	7350	1/03	22	4.3	2.8
NORTHEAST ENTRANCE PILLOW	7350	1/01	SP	3.8	3.3
PIKE CREEK	7150	K/30	26	5.6	7.6
PETERSON MEADOWS	7200	K/27	18	3.1	4.6
PETERSON MEADOWS PILLOW	7200	K/27	SP	3.6	5.0
PICKFOOT CREEK	6650	K/27	25	5.5	-
PICKFOOT CREEK PILLOW	6650	1/01	SP	5.9	5.6
PIKE CREEK	5930	K/27	32	6.6	11.0
PIKE CREEK PILLOW	5930	1/01	SP	6.7	11.9
PIKESTONE PASS	7200	K/28	9	1.0	2.9
PLACER BASIN PILLOW	8830	1/01	SP	8.0	6.9
PODRIAN CREEK	5100	K/28	44	10.8	14.5
PODRIAN CREEK PILLOW	5100	1/01	SP	10.3	12.6
PODRIAN CREEK PILLOW	6500	K/30	17	3.9	-
PODRIAN CREEK PILLOW	6500	1/01	SP	3.4	3.4
PODRIAN CREEK PILLOW	5260	K/27	37	9.1	12.7
PODRIAN CREEK PILLOW	8000	K/28	22	3.7	5.8
PODRIAN CREEK PILLOW	8000	1/01	SP	3.4	6.6
PODRIAN CREEK PILLOW	4700	K/26	13	1.5	1.2
PODRIAN CREEK PILLOW	4700	K/26	SP	1.8	1.9
PODRIAN CREEK PILLOW	7940	K/27	37	9.5	11.2
PODRIAN CREEK PILLOW	7900	1/01	SP	10.8	11.3
PODRIAN CREEK PILLOW	8100	K/27	41	10.2	10.6
PODRIAN CREEK PILLOW	8100	1/01	SP	11.1	10.8
PODRIAN CREEK PILLOW	6630	K/29	12	2.4	1.9
PODRIAN CREEK PILLOW	6630	1/01	SP	2.4	1.7
PODRIAN CREEK PILLOW	7250	K/27	31	6.9	8.0
PODRIAN CREEK PILLOW	7250	1/01	SP	7.4	8.1
PODRIAN CREEK PILLOW	6200	1/01	SP	10.1	10.5
PODRIAN CREEK PILLOW	8100	K/30	43	12.2	11.4
PODRIAN CREEK PILLOW	8100	1/01	SP	9.0	7.4
PODRIAN CREEK PILLOW	8100	K/29	34	8.2	7.6
PODRIAN CREEK PILLOW	8100	1/01	SP	9.2	8.6
PODRIAN CREEK PILLOW	6030	K/28	51	14.6	14.8
PODRIAN CREEK PILLOW	6030	1/01	SP	12.6	14.6
PODRIAN CREEK PILLOW	7780	K/27	24	5.0	8.7
PODRIAN CREEK PILLOW	3960	K/26	13	1.8	1.4
PODRIAN CREEK PILLOW	4080	K/26	16	2.2	1.0
PODRIAN CREEK PILLOW	6600	K/28	17	2.6	4.2
PODRIAN CREEK PILLOW	6800	K/28	20	3.5	5.1
PODRIAN CREEK PILLOW	8000	K/28	23	4.4	6.4
PODRIAN CREEK PILLOW	8000	K/28	17	8.4	8.0
PODRIAN CREEK PILLOW	8000	1/01	SP	7.7	7.4
PODRIAN CREEK PILLOW	4060	K/27	16	1.8	2.0
PODRIAN CREEK PILLOW	5600	K/29	37	7.1	7.9
PODRIAN CREEK PILLOW	5600	1/01	SP	6.6	6.0
PODRIAN CREEK PILLOW	7150	K/31	55	6.8	9.6
PODRIAN CREEK PILLOW	6510	K/29	45	11.8	13.2

SNOW January 1984		THIS YEAR			PAST RECORD	
DRAINAGE BASIN and/or SNOW COURSE		Date of Survey	Snow Depth (Inches)	Water Content (Percent)	Water Content (Inches)	
NAME	Elevation				1983	1984
TWIN LAKES PILLOW	6400	1/01	SP	13.8	13.1	17.2
WALDRON	5600	K/31	15	2.8	3.2	8.9
WALDRON PILLOW	5600	1/01	SP	2.6	3.9	4.7
WARM SPRINGS	7800	1/03	31	7.4	6.8	10.6
WARM SPRINGS PILLOW	7800	1/01	SP	8.6	8.1	11.6
WEASEL DIVIDE	5450	K/28	38	9.9	15.5	16.9
WEST YELLOWSTONE	6700	K/31	28	5.8	7.4	5.0
WEST YELLOWSTONE PILLOW	6700	K/31	SP	6.0	5.8	4.6
WHISKEY CREEK	6800	K/27	38	9.0	11.5	7.1
WHISKEY CREEK PILLOW	6800	1/01	SP	7.7	9.6	7.3
WHITE MOUNTAIN	8700	1/01	SP	10.8	9.0	11.0
WHITE MOUNTAIN PILLOW	8700	K/29	19	4.1	4.4	3.8
WILLOW CREEK	6500	K/29	30	5.8	7.8	5.7
WOOD CREEK PILLOW	5960	1/01	SP	2.2	5.5	-
WOOD CREEK PILLOW	6500	K/29	30	5.8	7.8	8.3
WOOD CREEK PILLOW	6500	K/30	38	9.3	11.7	8.0
WOOD CREEK PILLOW	6500	K/31	24	4.4	9.0	4.4
HUMBOLDT GULCH	4250	K/29	23	3.6	6.0	-
HUMBOLDT GULCH PILLOW	4250	1/01	SP	4.4	-	-
ISLAND PARK	6290	K/30	35	7.9	10.8	6.4
ISLAND PARK PILLOW	6290	1/01	SP	7.5	-	-
KILGORE	6320	K/28	28	5.8	8.4	4.4
LOLO PASS	5230	K/29	35	8.0	8.4	12.1
LOLO PASS PILLOW	5230	1/01	SP	10.2	-	-
LOOKOUT	5250	K/28	49	11.7	16.8	14.4
MOOSE CREEK	6200	K/28	30	7.6	8.8	7.1
MOOSE CREEK PILLOW	6200	1/01	SP	8.3	-	-
MOSQUITO RIDGE PILLOW	5200	1/01	SP	12.9	-	-
SAVAGE PASS PILLOW	6170	1/01	SP	9.0	-	-
SAWTELL MOUNTAIN	8720	K/30	65	20.7	25.1	13.7
SUNSET PILLOW	5540	1/01	SP	12.3	-	-
TARGHEE PASS	6980	K/30	29	6.6	9.0	6.1
VALLEY VIEW	6680	K/30	30	6.9	10.1	6.2
WHITE ELEPHANT	7210	K/30	66	13.3	15.3	9.1
WHITE ELEPHANT PILLOW	7210	1/01	SP	13.7	-	-
WILD MOUNTAIN (WY)	9380	1/01	EST	10.7	10.1	-
WILD MOUNTAIN PILLOW (WY)	9380	1/01	SP	10.2	10.8	9.7
BEARTOOTH LAKE PILLOW (WY)	9270	1/01	SP	8.8	5.1	-
BURGESS P.S. (WY)	7850	1/01	EST	3.5	-	3.5
EAST ENTRANCE (WY)	6960	K/31	24	4.8	5.2	4.7
EVENING STAR PILLOW (WY)	9200	1/01	SP	13.1	6.9	-
LAKE CAMP (WY)	7780	K/30	23	4.0	3.3	5.8
LUPINE CREEK (WY)	7380	1/02	21	4.2	4.4	4.8
NORRIS BASIN (WY)	7500	K/31	24	4.1	4.7	5.1
OLD FAITHFUL (WY)	7410	K/30	30	6.4	7.7	7.2
PARKERS PEAK PILLOW (WY)	9200	1/01	SP	11.8	-	12.5
SYLVAN LAKE PILLOW (WY)	8420	1/01	SP	12.0	10.5	-
SYLVAN PASS (WY)	7980	K/31	29	5.2	4.0	6.1
THUMB DIVIDE (WY)	7100	1/05	35	8.4	9.7	8.6
TOGWOTEE PASS (WY)	9580	1/04	55	16.5	15.2	15.6
TROUT CREEK PILLOW (WY)	8400	1/01	SP	3.1	2.6	-
TWO OCEAN PLATEAU PILLOW (WY)	8160	1/01	SP	14.8	-	-
WOLVERINE (WY)	7650	K/31	24	4.1	5.1	5.5
WOLVERINE PILLOW (WY)	7650	1/01	SP	4.3	5.1	5.5
YOUNG'S PEAK PILLOW (WY)	8350	1/01	EST	2.5	4.2	8.4
FIDELITY MOUNTAIN (BC)	6150	K/31	54	13.6	13.1	23.1
GLACIER (BC)	4100	K/31	31	5.6	8.1	13.1
GRAY CREEK LOWER (BC)	5030	1/01	24	5.1	7.3	6.7
POCKING HORSE (BC)	5410	1/02	28	4.1	3.9	4.1



# Columbia River Drainage

## STREAMFLOW FORECASTS

DRAINAGE BASIN and/or FORECAST POINT	THIS YEAR				PAST RECORD				THIS YEAR			
	FORECAST		PAST RECORD		FORECAST		PAST RECORD		FORECAST		PAST RECORD	
	Thousand Acre Feet	Percent of Average	Thousand Acre Feet	Percent of Average	Thousand Acre Feet	Percent of Average	Thousand Acre Feet	Percent of Average	Thousand Acre Feet	Percent of Average	Thousand Acre Feet	Percent of Average
1984	April - September				April - July				April - June			
KOOTENAI RIVER below Libby Dam (1)	6,750	96	7,041	5,750	96	6,020			5,870	97	5,157	6,051
KOOTENAI RIVER at Leona (1)	8,350	97	7,948	8,602	7,260	97	6,857	7,498	610	78		782
BLACKFOOT RIVER near Bonner	790	79		999	705	78		904	520	87		597
CLARK FORK RIVER above Milltown (6)	710	87		816	620	88		708	425	92	880	1,379
CLARK FORK RIVER above Missoula	1,500	83	1,362	1,815	1,325	82	1,133	1,612	1,130	82		1,379
BITTERROOT RIVER near Darby	525	91		580	484	91		532	1,055	89		464
BITTERROOT RIVER at Missoula (9)	1,320	88		1,504	1,219	88		1,384	2,185	85		1,191
CLARK FORK RIVER below Missoula	2,820	85		3,319	2,544	85		2,996	3,320	97	2,437	2,570
CLARK FORK RIVER at St. Regis	3,760	96	3,450	3,933	3,400	97	3,073	3,504	1,150	78		3,428
NORTH FORK FLATHEAD RIVER near Columbia Falls	1,490	78		1,913	1,350	78		1,732	1,230	85	1,122	1,471
MIDDLE FORK FLATHEAD RIVER near West Glacier	1,570	84	1,545	1,869	1,440	84	1,401	1,713	1,610	85	1,416	1,453
SOUTH FORK FLATHEAD RIVER near Columbia Falls (10)	1,950	86	1,847	2,278	1,820	85	1,715	2,142	4,120	84	3,654	1,886
FLATHEAD RIVER at Columbia Falls (10)	5,130	83	4,943	6,208	4,750	83	4,508	5,721	4,810	84	4,420	4,921
FLATHEAD RIVER near Polson (11)	6,075	83	6,130	7,278	5,580	83	5,538	6,712	7,840	83	6,902	5,759
CLARK FORK RIVER near Plains (11)	10,100	83	9,880	12,153	9,180	83	8,748	11,071	8,640	82		9,459
CLARK FORK RIVER at Whitehorse Rapids (12)	11,100	82		13,575	10,100	82		12,351				10,570

- (1) Adjusted for storage in Lake Koocanusa.
- (2) Adjusted for storage in Silver Lake, diversions to and pumping from Georgetown Lake.
- (3) Adjusted for storage in Georgetown Lake, diversions from and pumping to Silver Lake.
- (4) Sum Flint Creek at Maxville and Boulder Creek at Maxville.
- (5) Sum of North Fork Lower Willow Creek near Hall and South Fork Lower Willow Creek near Hall.
- (6) Difference in observed flow Clark Fork above Missoula and Blackfoot near Bonner.

- (7) Adjusted for storage in Painted Rocks Reservoir.
- (8) Adjusted for diversion into Sunset Highline Canal.
- (9) Difference in observed flow Clark Fork above and below Missoula.
- (10) Adjusted for storage in Hungry Horse Reservoir.
- (11) Adjusted for storage in Hungry Horse Reservoir and Flathead Lake.
- (12) Adjusted for storage in Hungry Horse Reservoir, Flathead Lake and Noxon Rapids Reservoir.

ALL FORECASTS PREPARED IN COOPERATION WITH THE NATIONAL WEATHER SERVICE

## SUMMARY of SNOW MEASUREMENTS

RIVER BASIN and/or SUBWATERSHED		THIS YEAR'S SNOW WATER AS PERCENT OF	
		1977-78	1978-79
East Kootenay/BC.	4	88	56
Kootenai/Montana	19	70	64
Kootenai above Bonners Ferry...	23	72	63
Little Bitterroot	5	73	64
N. Fk. Flathead...	7	74	67
M. Fk. Flathead...	7	61	61
S. Fk. Flathead...	5	69	92
Swan .....	3	78	100
Flathead .....	27	70	74
Stillwater & Whitefish.....	3	76	65
Clark Fork above Blackfoot .....	32	69	71
Blackfoot .....	14	81	74
Upper Clark Fork above Missoula	46	72	72
Bitterroot .....	14	91	78
Lower Clark Fork below Missoula .	9	82	81
Clark Fork (Total w/o Flathead)...	69	80	76
Pend O'Reille (Clark Fork & Flathead) .....	96	76	75
Columbia (Pend O'Reille & Kootenai) .....	92	77	71

## Snowfall pH

Snow surveyors in Montana will again be making snow pH measurements in conjunction with snow surveys. This will be the fourth year that pH measurements have been made.

## LATE ARRIVING DATA

### SNOW January 1984

DRAINAGE BASIN and/or SNOW COURSE	Elevation	THIS YEAR			PAST RECORD	
		Date of Survey	Snow Depth (Inches)	Water Content (Inches)	Water Content (Inches)	
NAME					Last Year	Average
Badger Pass	6900	1/07	27	9.5A	13.5	20.8
Blue Lake	5900	1/07	16	5.5A	10.0	10.8
Holbrook	4530	1/07	8	2.5A	3.5	4.4
North Fork Jocko	6330	1/07	55	19.0	17.0	19.3
Spotted Bear Mountain	7000	1/07	20	5.3	7.0	7.1
Stuart Mountain	7400	1/07	47	15.2	13.0	13.2
Trinkus Lake	6100	1/07	53	18.8	18.0	18.2
TV Mountain	6800	1/07	31	9.2	7.4	7.9
Twin Creeks	3580	1/07	9	3.0A	5.5	5.7
Upper Holland Lake	6200	1/07	43	13.8	11.0	15.4

## RESERVOIR STORAGE (Thousand Acre Feet) END OF MONTH December 1983

Basin or Reservoir		1983	1982	1981	1980
COLUMBIA					
Kootenai	Koocanusa	5,748.2	3,619.0	3,645.0	---
Flathead	Hungry Horse	3,451.0	2,611.0	3,224.0	2,299.0
	Flathead Lake	1,791.0	1,096.0	1,284.0	1,325.0
	Camas (4)	45.2	28.1	29.0	16.8
	Mission Valley (8)	100.3	52.5	40.3	35.3
Clark Fork	Georgetown Lake	31.0	27.7	28.2	28.7
	Lower Willow Creek	4.9	---	1.3	1.2
	Nevada Creek	12.6	3.4	4.9	3.8
	Noxon Rapids	334.6	318.4	327.0	314.1
Bitterroot	Painted Rocks	31.7	---	---	---
	Como	34.9	18.5	11.2	8.5
MISSOURI					
Beaverhead	Lima	84.0	18.4	47.5	39.5
	Clark Canyon	257.2	183.5	172.2	145.4
Ruby	Ruby	38.8	26.5	22.3	21.4
Madison	Hebgen Lake	377.5	261.7	274.2	258.9
	Ennis Lake	41.0	31.0	30.4	33.4
Gallatin	Middle Creek	8.0	4.0	3.7	3.1
Missouri	Canyon Ferry	2,043.0	1,785.0	1,821.0	1,629.0
	Hausen & Helena	61.9	63.0	63.0	62.2
	Helena Valley	10.4	4.8	---	6.4
	Lake Helena	10.4	10.9	10.9	10.6
	Holter Lake	81.9	77.2	80.5	78.5
	Fort Peck Lake	18,910.0	16,250.0	16,040.0	16,310.0
Smith	Smith River	10.6	8.2	7.3	6.4
	Newman Creek	12.4	8.8	8.9	9.4
Musselshell	Sair	7.0	2.2	5.0	4.0
	Martinsdale	23.1	13.0	17.4	10.7
	Deadman's Basin	72.2	51.0	64.8	43.2
Sun	Gibson	99.1	43.0	54.0	41.2
	Willow Creek	32.2	23.9	23.4	21.2
	Pishkun	32.0	19.8	20.5	17.2
Marias	Lower Two Medicine	11.9	---	---	---
	Four Horns	19.2	---	---	---
	Swift	30.0	9.8	11.7	13.0
	Lake Frances	111.9	47.1	85.7	70.7
Milk	Elwell (Tiber)	1,347.0	691.8	689.9	510.2
	Beaver Creek	3.5	3.1	3.0	1.6
	Fresno	127.2	27.0	15.5	61.3
	Nelson	66.8	42.0	48.7	40.0
HUDSON BAY					
St. Mary's	Lake Sherburne	64.3	26.5	31.4	18.3
YELLOWSTONE					
Stillwater	Mystic Lake	21.0	10.3	8.9	12.4
Clark's Fork	Cooney	27.4	16.1	15.0	12.6
Tongue	Tongue River	68.0	13.0	29.1	26.8
Bighorn	Bighorn Lake	1,356.0	913.6	985.0	667.7

## AGENCIES AND ORGANIZATIONS COOPERATING IN MONTANA SNOW SURVEYS

### GOVERNMENT AGENCIES

#### Canada

- Department of the Environment
- Atmospheric Environment Service
- Water Management Service
- British Columbia Ministry of Environment
- Inventory and Engineering Branch, Hydrology Section
- Alberta Environment
- Technical Services Division

#### Federal

- Department of the Army - Corps of Engineers
- Department of Agriculture - Forest Service
- Soil Conservation Service
- Department of Commerce - National Environmental Satellite Service
- National Weather Service
- Department of Interior - Bureau of Indian Affairs
- Fish and Wildlife Service
- Geological Survey
- National Park Service
- Bureau of Reclamation
- Department of Energy - Bonneville Power Administration

### STATE AGENCIES

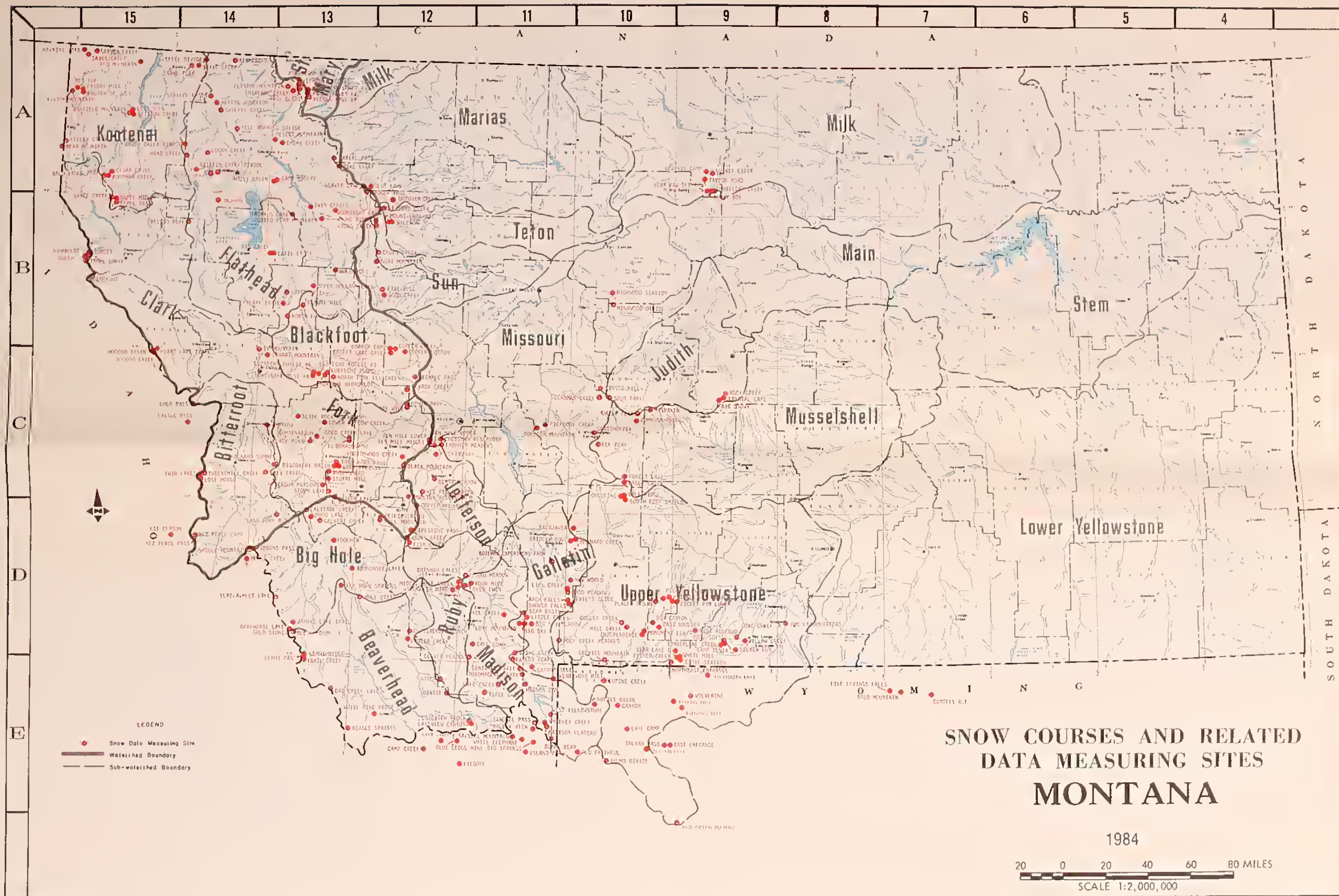
- Montana Conservation Districts
- Montana Department of Fish, Wildlife and Parks
- Montana Department of Natural Resources and Conservation
- Montana State University - Agricultural Experiment Station
- University of Montana - School of Forestry

### PRIVATE ORGANIZATIONS

- The Anaconda Company
- Big Sky of Montana
- Butte Water Company
- Flathead Valley Community College
- Montana Power Company

Other organizations and individuals furnish valuable information for snow survey reports. Their cooperation is gratefully acknowledged.



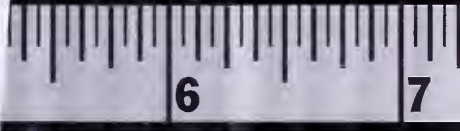
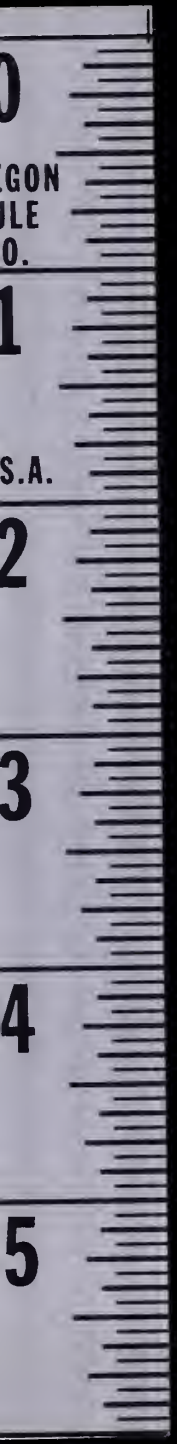


# INDEX TO MONTANA SNOW COURSES AND DATA SITES

Snow Course	Elev.	Sec.	Top.	Range	Sensors in Addition to Snow Course	Drainage Basin	Snow Course	Elev.	Sec.	Top.	Range	Sensors in Addition to Snow Course	Drainage Basin	Snow Course	Elev.	Sec.	Top.	Range	Sensors in Addition to Snow Course	Drainage Basin
Abundance Lake	2800	1	35	11W		Big Hole	Gibbons Pass	7100	3	25	19W		Billings	*Saddle Mountain	7940	5	25	19W		Billings
Adams	6480	7d	94	1PM		Billings	Goat Mountain	7000	20	22W	10W		Billings	Seniela Creek	8300	17	105	1E		Billings
Agua Fria	7350	1	55	SE		Gallatin	Gold Creek Lake	7200	21	84	32W		Gallatin	*Shower Falls	8100	14	55	6E	S,P,I	Gallatin
Ashley Divide	1870	10	28W	23W	P	Flathead	Gold Stone	8100	11	85	16W		Flathead	*Silver Run	6630	11	85	19E	S,P,I	Upper Yellowstone
Ashley Lake	4600	8	28W	23W	P	Flathead	Goshute	7000	19	94	8E		Flathead	*Slickhorn Summit	7750	30	64	17W	S,P,I	Clark Fork
*Badger Peak	4700	1	27W	11W	A,P,I,I	Idaho-Marias-Sun	*Gardner Creek	4300	1	26W	25W	S,P,I	Idaho-Marias-Sun	*Island Lake	6200	29	19W	12W	S,P,I	Flathead
Bald Eagle Peak	5700	6	27W	31W		Idaho-Marias-Sun	Griffin Creek Divide	5150	18	78W	25W		Idaho-Marias-Sun	Slag-A-Mell Lake	8750	29	55	12W		Big Hole
Bald Ridge	7500	13	4W	101		Upper Yellowstone	Gunnlight Lake	6300	30	26W	13W		Upper Yellowstone	Slide Rock Mountain	7100	15	104	16W		Clark Fork
Bearhead Mountain	5600	1	32W	30W	S,P,I,W	Flathead	*Hend Creek	5035	6	29W	25W	S,P,I	Flathead	Smuggler Mine	6960	24	15	1W		Ruby
Baker Creek	5500	14	26W	11W		Flathead	Hawkins Lake	6420	18	37W	23W	S,P,I,W	Flathead	*South Fork Shiloh	8100	13	4W	10E	S,P,I	Upper Yellowstone
Baker Mtn	4600	31	76W	30W		Flathead	Hawkins	8050	16	31W	12W		Flathead	Spotted Bear Mountain	7000	21	25W	12W	A	Flathead
Baker Mtn	4600	31	76W	30W		Flathead	Hawkins Lake	8050	16	31W	12W		Flathead	*Spot Peak	8100	20	17W	9E	S,P,I	Flathead
*Baker Peak	8250	12	1W	12W	S,P,I	Clark Fork	Hawkins Lake	8050	16	31W	12W		Clark Fork	*Star Peak	1020	5	36W	22W	S,P,I	Flathead
*Baker Peak	7180	31	1W	7W	S,P,I	Clark Fork	Hawkins Lake	8050	16	31W	12W		Clark Fork	Star Lake 1	4650	31	85	13E	A	Upper Yellowstone
Baker Peak	5150	31	71W	25W		Flathead	Hawkins Junction	4850	19	34W	23W		Flathead	Stamps Pass	1400	16	11W	7W		Missouri Main Stem
*Beagle Springs	8850	6	115	11W	S,P,I	Beaverhead	Highwood Divide	5650	16	19W	9E	P,HSC	Missouri Main Stem	Storm Lake	7780	19	4W	12W		Clark Fork
Beaver Run	8150	5	13	31		Gallatin	Highwood Station	1600	20	20W	9E	P,HSC	Missouri Main Stem	Stanger Basin	6180	26	17W	21W	P	Flathead
Beaver Run Ski Area	5700	21	74W	161	P	Hill	Hill	1510	18	21W	13W		Hill	Stuart Hill	6500	19	5W	13W		Clark Fork
Beaver Lake	5900	31	28W	11W		Flathead	Hood Mountain	6600	22	15	6E		Gallatin	Stuart Mountain	7100	6	11W	18W		Clark Fork
Berry Meadow	7000	8	24	5W		Jefferson	*Hood Mountain	6050	17	11W	7W	S,P,I	Clark Fork	Sucha Creek	3940	11	29W	161	P	Hill
Big Creek	6750	2	27W	18W		Flathead	Hood Mountain	5900	16	11W	7W		Clark Fork	Taylor Peak	4500	24	95	21	S,P	Gallatin
Big Sky	7700	10	65	11	P	Gallatin	Hood Mountain	5600	3	35W	17W		St. Mary	Taylor Road	1080	19	29W	161	P	Gallatin
Big Sky Meadow	6750	25	65	31		Gallatin	Independence	7850	21	75	11W		Upper Yellowstone	Van Mile Lower	6600	12	84	6W		Missouri Main Stem
Big Snowy	7150	25	17W	17E		Judith	Interlodge	6450	6	24	13W		Clark Fork	Van Mile Middle	6600	18	84	6W		Missouri Main Stem
*Black Bear	7550	77	155	51	S,P,I	Madison	Jack Creek	6650	1	65	1E		Madison	Van Mile Upper	6000	29	84	5W		Missouri Main Stem
Black Mountain	7750	34	7W	2W		Clark Fork	Johns Lake Trail	7200	14	25	16W		Big Hole	*Tapes Creek	8000	15	125	1W	S,P,I	Madison
*Black Pine	7180	24	8W	15W	S,P,I	Clark Fork	Johnson Peak	6450	16	104	111	P	Maxwell	Timberline Creek	8550	10	85	181		Upper Yellowstone
*Bloodie Dick	7600	12	85	16W	S,P,I	Beaverhead	Josephine Lower #3	1900	22	35W	16W		St. Mary	Trail Creek	7090	15	105	35W		Beaverhead
Blue Lake	5900	75	78W	11W	A	Idaho-Marias-Sun	Kaiser Creek	3100	25	30W	35W		Idaho-Marias-Sun	Timber Lake	6100	9	25W	12W		Flathead
Bolt Lake	7750	35	25	18E		Upper Yellowstone	Kings Hill	7500	34	13W	8E		Missouri Main Stem	Tussock Lake	1060	10	26W	22W		Flathead
*Boulder Mountain	7250	1	9W	31	S,P,I	Missouri Main Stem	Kishinoue	3890	14	27W	22W		Flathead	*V Mountain	6800	33	12W	19W		Clark Fork
*Box Canyon	6670	28	65	121	S,P,I	Upper Yellowstone	Kishinoue Camp	3720	9	29W	16E	P,I,W	Hill	*Waterside Creek	5600	31	5W	13W	S,P,I	Clark Fork
Boulder Creek	5100	24	28W	16E	P	Hill	*Kist Creek	6100	27	115	1E	S,P,I	Flathead	*Went One Mile	7150	1	115	51		Gallatin
*Boulder Lake	7775	2	75	51	S,P,I,HIC	Gallatin	Kist Canyon	6930	26	145	2W		Madison	*Went One Mile	3580	25	26W	16W	A	Flathead
Boulder Lake	8850	5	15	3W		Ruby	Lakeview Canyon	7400	77	115	2W	S,P,I	Beaverhead	*Went One Mile	6510	37	5W	23W	S,P,I	Billings
Bridges Bowl	7250	25	111	1W	S,P	Gallatin	*Lakeview Ridge	7400	77	115	2W	S,P,I	Beaverhead	Upper Hellam Lake	6700	28	20W	15W		Flathead
Bullhead Creek	3900	2	37W	10W		Idaho-Marias-Sun	Leah Pass	7480	9	105	35W		Beaverhead	*Madison	5600	17	25W	9W	S,P,I	Idaho-Marias-Sun
Brush Creek Lake	5000	12	30W	20W		Idaho-Marias-Sun	*Leah Pass	8100	4	105	15W	S,P,I	Beaverhead	*Warm Springs	7800	13	6W	17W	S,P,I	Clark Fork
Bull Mountain	6600	18	7W	2W		Big Hole	*Leah Pass	8100	4	105	15W	S,P,I	Beaverhead	*Weaver Divide	5450	20	37W	21W		Flathead
Cabin Creek	5700	34	23W	10W		Idaho-Marias-Sun	Little Pass	7100	22	65	3E		Gallatin	*West Rossburg	7500	9	25	161		Upper Yellowstone
Cabin Creek	8050	21	65	2W		Madison	Logan Creek	4300	31	30W	23W		Flathead	*West Yellowstone	1700	39	135	11	S	Madison
*Calf Creek	6430	31	2W	14W	S,P,I	Big Hole	Lone Mountain	8880	25	65	71		Gallatin	*Whitely Creek	8100	18	95	51	S,P,I	Madison
Camp Mtn	6400	10	28W	18W		Flathead	Lost Horse	5940	5	11W	23W		Billings	*Whitely Hill	8100	18	95	51	S,P,I	Upper Yellowstone
Camp Santa	2890	2	65	18W		Upper Yellowstone	Lost Soul	4800	31	31W	29W		Idaho-Marias-Sun	White Pine Ridge	8500	18	115	9W		Upper Yellowstone
*Carrizo Basin	4000	18	105	91	S,P,I	Gallatin	*Lower Twin	7900	12	65	3W	S,P,I	Madison	White Pine Ridge	8500	18	115	9W		Upper Yellowstone
*Carrizo Basin	7800	22	65	7W	S,P,I	Gallatin	Town Willow Creek	4140	1	9W	11W	P,HSC	Clark Fork	*Wood Creek	5960	36	20W	16W	S,P,I	Idaho-Marias-Sun
*Carrizo Basin	7800	22	65	7W	S,P,I	Gallatin	Tubrecht Flume	4680	13	13W	11W	S,P,I	Clark Fork	Wood Creek	5700	22	25W	10W		Idaho-Marias-Sun
Cedar Grove	3760	35	26W	15W		Idaho-Marias-Sun	Tubrecht Flume #3	5450	19	13W	14W		Clark Fork	Wood Ridge	1200	17	25W	10W		Idaho-Marias-Sun
Climax Pass	6200	2	64	5W		Idaho-Marias-Sun	Tubrecht Flume #4	4040	13	13W	15W		Clark Fork	[DATA]						
Chicken Creek	4010	14	33W	21W		Flathead	Tubrecht Flume #5	4040	13	13W	15W		Clark Fork	Abner Burle	1100	1	18W	51		Spokane
Christensen Ranch	1400	11	25	7W	P,HSC	Beaverhead	Tubrecht Flume #6	4040	13	13W	15W		Clark Fork	*Bear Mountain	5100	2	57W	31	S,P,I	Pend Oreille
*Climax Meadow	8600	78	25	7W	S,P,I	Idaho-Marias-Sun	Tubrecht Flume #7	4040	13	13W	15W		Clark Fork	Big Springs	6400	1	13W	141		Snake
*Climax Meadow	7850	26	75	19E	S,P,I	Upper Yellowstone	Tubrecht Flume #8	4040	13	13W	15W		Clark Fork	Big Springs	6400	1	13W	141		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #9	4040	13	13W	15W		Clark Fork	Blue Lodge Mine	6700	27	13W	281		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #10	4040	13	13W	15W		Clark Fork	Camp Creek	1800	21	13W	361		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #11	4040	13	13W	15W		Clark Fork	*Cass Creek	6200	6	12W	391	S,P,I	Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #12	4040	13	13W	15W		Clark Fork	*Climax Gulch	4750	2	18W	51	S,P,I	Climax
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #13	4040	13	13W	15W		Clark Fork	Clarendon Park	6290	28	13W	431		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #14	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #15	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #16	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #17	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #18	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #19	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #20	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #21	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #22	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #23	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #24	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #25	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #26	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #27	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #28	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #29	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #30	4040	13	13W	15W		Clark Fork	*Climax	6200	6	12W	391		Snake
*Climax Meadow	1300	31	75	101	P	Upper Yellowstone	Tubrecht Flume #31													







12/18/14  
CAT31294856\_117  
Water supply outlook for Montana and federal-state-private cooperativ  
snow surveys  
1984:Jan.  
1984  
1.96 R31Fsmo  
125  
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Batch: NAL15\_0024



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